

A Demographic Profile of Participants in Two Gulf of Mexico Inshore Shrimp Fisheries and Their Response to the Texas Closure

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Introduction

The life cycle of Gulf of Mexico shrimp ranges from the inland coastal estuaries into the deeper waters of the Gulf. Consequently, shrimp are harvested by both inshore and offshore shrimpers. These two user groups harvest the same resource, yet are distinct with respect to their fishing locations, the size and value of shrimp they target, and the government management regimes that regulate them. Concerns regarding equitable allocation of the resource have historically influenced management decisions pertaining to regulation of inshore and offshore

shrimp seasons. However, it has been difficult to make such allocative decisions and monitor the effectiveness of policies when little is known about the social characteristics and economic needs of inshore fishermen.

In 1981, the Gulf of Mexico Fisheries Management Council (GMFMC) implemented a policy known as the Texas closure (Gulf of Mexico Fishery Management Council, 1980; Leary, 1985). This closure of the exclusive economic zone (EEZ) off the Texas coast, from about 1 June through 15 July, is concurrent with the closure of state waters which has been in effect since 1959 (Texas Shrimp Conservation Act, 1959). The Federal closure permitted, for the first time, a total closure of the fishery for brown shrimp, *Penaeus aztecus*, fishery from the coastline to 200 n.mi. off the Texas coast. The objectives of the closure were twofold: 1) To increase the value of the offshore shrimp fishery by delaying

the harvest of shrimp until they reached an optimum size and 2) to reduce the wasteful discard of undersized shrimp by eliminating count restrictions (Jones et al., 1982; Klima et al., 1982; Matthews, 1982; Nichols, 1982; Poffenberger, 1982). For the past eight years (1981-88) the GMFMC has agreed to continue the Texas closure. However, the 1986 through 1988 closures were each reduced from 200 miles to only 15 miles off the Texas coast. It was determined by the GMFMC that this reduced closure would provide sufficient protection for the small brown shrimp while permitting the harvest of larger brown shrimp in deeper waters.

Since its inception, the biological and economic impacts of the Texas closure on the offshore shrimp fishery have been monitored (Jones and Zweifel, 1982; Klima et al., 1982, 1983, 1984, 1985, 1986, 1987; Nance et al., 1988; Poffenberger, 1982). The social impacts of the Texas closure on the offshore fisherman began to be studied in 1986 (Klima et al., 1987; Nance et al., 1988), but to date no attempt has been made to study the impacts of the Texas closure on inshore shrimpers. Consequently, the full effects of the Texas closure are unknown. Further, little is known about the importance of the inshore shrimp fisheries to the local economies, making it difficult for the GMFMC to make informed decisions regarding equitable allocations of the shrimp resource.

The goals of this report are to 1) identify the marketing and distribution channels toward which the inshore fisheries are oriented, 2) describe the demographic

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ABSTRACT—A social study of the shrimp fisheries of Galveston Bay, Tex., and Calcasieu Lake, La., was made during the summer of 1987 to examine the impacts of the seasonal closure of the Federal waters off Texas and to understand the infrastructure and demographic processes of these two diverse fisheries. Survey instruments were administered to 159 shrimp boat captains: 89 from Galveston Bay and 70 from Calcasieu Lake. Shrimp-house owners were interviewed in each region as well.

The results suggest that the inshore fisheries (i.e., shrimpers and shrimp houses) are distinct from the offshore fisheries. The infrastructure of the two inshore fisheries ex-

amined differ in that the market distribution of shrimp from Galveston Bay was more diffuse than from Calcasieu Lake. Much more of the shrimp harvested from Galveston Bay was channelled into the surrounding community than from Calcasieu Lake.

The distribution of age, years as a commercial fisherman, and family involvement in fishing suggest that participation in Calcasieu Lake's and Galveston Bay's inshore fisheries have expanded concurrent with declining economies. While overall the Texas closure had little impact on either of the inshore fisheries, the Galveston Bay shrimpers experienced more of a direct impact on their livelihood than Calcasieu Lake shrimpers.

profiles of two Gulf of Mexico inshore shrimp fisheries, and 3) examine the impacts of the Texas closure on inshore shrimpers near the closure area by assessing their opinions and perceptions of how they have been affected by this policy.

Galveston Bay, Tex., and Calcasieu Lake, La., were the two areas chosen for study of the inshore shrimp fisheries. These areas were chosen for three reasons: 1) They are located in neighboring states and are near each other, separated by about 75 miles, 2) the fisheries were anticipated to differ socially and industrially since they target different sizes of shrimp, and 3) the bays represent very different natural and human environments reflecting some measure of the considerable socioeconomic diversity that characterizes the U.S. Gulf of Mexico coastal communities.

The Study Areas

Galveston Bay

Galveston Bay is an irregularly shaped estuary 17 miles long by 3 miles wide at its most distant points (Fig. 1). Its depth ranges from 2 to 44 feet, exclusive of navigation channels. The Bay is heavily used for shipping, recreational fishing, and boating, as well as for the commercial harvest of shrimp, oysters, and crabs. It is bordered to the southeast and northwest by the cities of Galveston and Houston, respectively, which are rapidly becoming linked by the expanding communities on the western side of the Bay. Little development has occurred on the east side of the Bay which is still characterized by rural communities. Overall, the population in the three counties surrounding the Bay is about 3.0 million (U.S. Dep. Commer., Bur. Census data, 1986).

While the eastern side of Galveston Bay is dominated by farms (rice and soybean) and wildlife reserves, the other areas of the Bay are industrially developed. Petrochemical, manufacturing, and tourist industries are the dominant economic entities in the region. The significance of Galveston Bay to the local economy is apparent in that 45 percent of the city of Galveston's economy is derived from waterborne commerce (Gal-

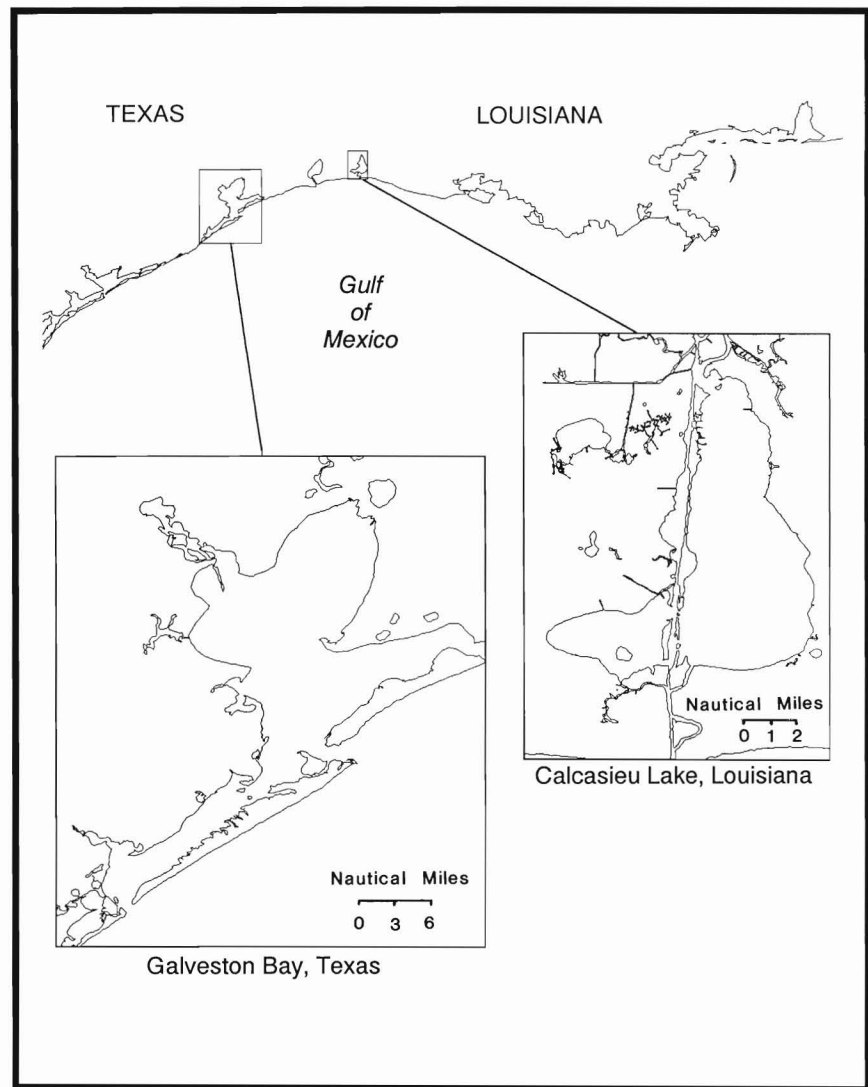


Figure 1.—Location of inshore fishery samplings sites.

veston Chamber of Commerce, 1987). Economic indicators (unemployment rates, industrial plant closings, export rates from deepwater ports, house foreclosures, etc.) suggest that the economics of the counties around Galveston Bay suffered a sharp decline beginning in about 1984 (Galveston Chamber of Commerce, 1987; Houston Chamber of Commerce, 1988).

The communities bordering the east side of Galveston Bay are characterized by ethnic uniformity. Caucasians are the dominant group present. In contrast, the

more urbanized areas around the Bay are ethnically diverse. Caucasians are still a prominent group, but Blacks and Hispanics are also found in considerable numbers. Southeast Asians (predominantly Vietnamese), Hispanics, and Italians comprise the majority of the recent immigrants residing in these communities.

The participants in the inshore shrimp fishery represent both the long-time residents and the growing immigrant presence in the bayside communities. Much of the change that has occurred

within the inshore fishery in recent years can be attributed to the expanding south-east Asian population. According to data from Texas Parks and Wildlife license files, the number of Vietnamese-owned boats in the counties around Galveston Bay has increased from 154 in 1981, to 437 in 1986. This represents a 280 percent increase, despite a corresponding 35 percent decrease in the number of licensed boats from 2,664 to 1,795 during these same years. Although these figures include both offshore and inshore boats, the majority of these Vietnamese boats participate in the inshore fishery since they possess one of the inshore license types.

Shrimping in Galveston Bay is done by trawling. Most of the boats in the inshore fishery are of a medium size (21-40 feet), while large boats (>40 feet) represent the least frequently used vessel size (Fig. 2). The differences between the number of vessels within each of the three vessel size categories are highly significant ($P = 0.01$).

Texas commercial shrimpers may hold any combination of three licenses: Bay, bait, or Gulf. The bay and bait licenses represent the inshore fishery, which is confined to harvesting shrimp in the non-nursery estuaries of Texas. The Gulf license is required in order to land shrimp caught in Gulf of Mexico waters. Both the inshore and offshore fisheries within the territorial sea are managed by Texas Parks and Wildlife. The Texas management objective for the commercial shrimp fisheries is to maximize the harvest of medium-to-large shrimp for sales to retail outlets, stores, restaurants, and for home consumption (Christmas and Etzold, 1977; Gulf of Mexico Fishery Management Council, 1980).

The bait shrimp fishery is a year-round fishery catering to the bait needs of recreational fishermen. Those shrimping with a bait license may harvest a maximum daily catch of 200 pounds, half of which must be kept alive, except during the period from 16 August to 15 November. Only one main trawl, with a width of 34 feet between the doors, may be used from the boat. Mesh size of the net may not be less than 6½ inches in length between the two most widely separated

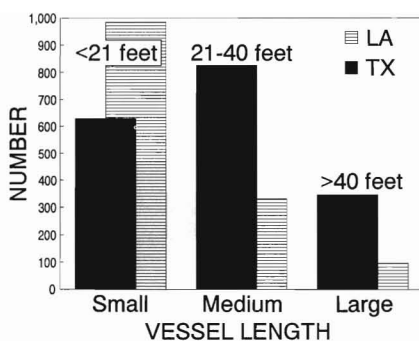


Figure 2.—Number of vessels in each size category for the two inshore sites.

knots in any consecutive series of five stretched meshes (Texas Parks and Wildlife Department, 1987). Unlike the commercial bay fishery (described next), the bait fishery is not restricted by either time of day or seasonal closure; a modification implemented when the Texas closure went into effect in 1981.

The management of the commercial bay fishery is regulated with seasonal closures and gear restrictions (Texas Parks and Wildlife Department, 1987). During the spring season, from 15 May to 15 July, shrimpers harvesting with a bay license may trawl with one main net no wider than 34 feet between doors. In addition, mesh size may not be less than 6½ inches in length between the two most widely separated knots in any consecutive series of five stretched meshes. Fishermen are limited to a daily catch of 300 pounds and permitted to shrimp only between sunrise and sunset (daylight). These restrictions are to ensure that a sufficient amount of brown shrimp migrate offshore. During the first part of the fall season, from 15 August to 15 October when inshore shrimpers mostly harvest white shrimp, *Penaeus setiferus*, bay shrimpers may harvest an unlimited amount of shrimp, however they are restricted by a size limit of 50 heads-on shrimp to the pound. From 15 October to 15 December, no size limit is imposed on shrimp harvested in the bays. During the entire fall season, from 15 August to 15 December, shrimpers are permitted to use one main net with a maximum total width, including the doors, of 95 feet,

and a mesh size not less than 8¾ inches between the two most widely separated knots in any consecutive series of five stretched meshes. These regulations enable the inshore shrimpers to target the larger and more valuable white shrimp which remain predominantly in the bays and nearshore in the Gulf. Thus, shrimping with a bay license is prohibited during the 1-month closure between the spring and fall seasons, and the 5-month closure between the fall and spring seasons. Overall, the regulations allocate the more highly migratory brown shrimp primarily to the offshore shrimpers, and the less migratory white shrimp to the inshore shrimpers. Both management regimes target large valuable shrimp.

Many shrimpers hold both bay and bait licenses to take advantage of the more lenient restrictions of the bait license during the seasonal closure, as well as the larger poundage allotment afforded by the bay license during nonclosure periods. This is evidenced by the increase in the percentage of shrimpers holding a bait license in conjunction with a Gulf and/or bay license from 28 percent in 1981 to 41 percent in 1987 (Texas Parks and Wildlife Department license files, 1981 and 1987). This increase in participation in the bait fishery has occurred despite a decrease in landings by Galveston Bay anglers (Osburn and Ferguson, 1985).

Calcasieu Lake

Calcasieu Lake is smaller than Galveston Bay, extending 2 miles wide and 3 miles long at its most distant points (Fig. 1). Calcasieu Lake is connected to the Gulf by a narrow channel known as Cameron Pass which is bordered by the fishing port of Cameron, La. Shrimp houses serving offshore vessels are, for the most part, located along the banks of Cameron Pass. The upper portion of Calcasieu Lake is characterized by an extensive network of bayous with marshlands providing nursery areas for juvenile shrimp. Shrimp houses and boats utilized in the inshore fishery are located along these channels in the upper portion of the bay and in West Cove.

Like Galveston Bay, Calcasieu Lake is heavily used for shipping. The Port of

Lake Charles is the largest exporter of rice in the United States (Lake Charles Chamber of Commerce, 1987), and the ship channel from the Gulf of Mexico to Lake Charles runs through Calcasieu Lake. Despite this similarity with Galveston Bay, however, the economy surrounding Calcasieu Lake is less diverse with respect to employment opportunities. In contrast to Galveston Bay, Calcasieu Lake is surrounded completely by Sabine National Wildlife Refuge and rural communities heavily dependent on farming (rice, soybeans), fishing (redfish, oysters, speckled trout, menhaden, crabs), and the petrochemical industry. Currently, 25 percent of Cameron's civilian labor force is employed in the fishing industry (Lake Charles Chamber of Commerce, 1987). Expansion of the inshore fishery has seemed to parallel the decline in the petrochemical industry due to the lack of industrial diversity in the region (Petty, 1986). Overall, the population in the two parishes surrounding the Lake is only about 27,500 (U.S. Dep. Commer., Bur. Census data, 1986).

The populations in these rural areas are much more ethnically homogeneous than those surrounding Galveston Bay. According to the most recent census, only 0.6 percent of the population is made up of ethnic minorities other than Blacks (U.S. Dep. Commer., Bur. Census data, 1986). Calcasieu Lake's inshore fishery reflects the same ethnic homogeneity characterizing the surrounding communities in that most of the inshore shrimpers are of Caucasian descent. This lack of ethnic diversity is a result of local unity and an unwillingness by the local shrimpers to allow newcomers, especially minorities, into the fishery or even to settle in the area.

Unlike the Galveston Bay fishery, Louisiana's fishery targets small shrimp destined for canneries (Pawlyk and Roberts, 1986). Of the 37,000 commercial shrimp licenses issued in 1986, only about 3,000 were issued to offshore vessels. The typical operation in Louisiana's shrimp fishery is a single-family business dominated by small vessels (Petty, 1986). The inshore shrimp fishery of Calcasieu Lake reflects this description with the majority of the inshore boats

being less than 21 feet (Fig. 2). As in Galveston Bay's fishery, the differences between the numbers of boats within each of the three size categories is highly significant ($P < 0.01$).

The inshore shrimp fishery in Louisiana is regulated by seasonal closures that roughly coincide with those implemented in Texas (Louisiana Sea Grant, 1987). Yet, there are four fundamental ways that Louisiana's management of the inshore shrimp fishery differs from that of Texas. First, Louisiana's closure between the spring and fall season is complete; without a developed tourist industry around Calcasieu Lake there is no local demand for bait shrimp. Second, size restrictions are lenient. Shrimpers are permitted to harvest heads-on shrimp greater than 100-count to the pound. Third, Calcasieu Lake inshore shrimpers may catch an unlimited amount of shrimp day and night, spring and fall. Fourth, Louisiana shrimpers are licensed according to the type of gear they use which varies depending on daytime or nighttime usage.

Inshore shrimpers purchase trawl licenses for day shrimping and butterfly licenses for night shrimping. Trawling occurs in the open portion of Calcasieu Lake, whereas the use of butterfly nets is limited to the narrow channels leading to and extending from the bay. Butterfly nets are attached to square metal frames suspended from either side of a boat or stationary structure, known as a barge or pontoon. The frames range in size from 12×8 feet to 12×16 feet on mobile structures. On stationary structures single nets 22×22 feet or double nets 12×12 feet are permitted. The nets are suspended just below the surface of the water to trap shrimp carried by the tides. Since success with butterfly nets depends on the strength of the tides, the intensity of night shrimping fluctuates with the lunar cycle. Fishing effort with butterfly nets, therefore, peaks from about 3 days before to about 3 days following either a new or full moon phase in the lunar cycle. Many shrimpers hold both a saltwater trawl and butterfly license enabling them to participate in both the daytime and nighttime fisheries. Louisiana prohibits the use of butterfly nets by

nonresidents who are not permitted to use this type of gear in their home states (Edwards, 1986). Thus, Texas shrimpers are prohibited from this sector of Louisiana's inshore shrimp fishery since butterfly nets are outlawed in Texas.

Materials and Methods

An interview survey was conducted with inshore shrimp boat captains in both Galveston Bay and Calcasieu Lake in the summer of 1987. License lists of captains from 1986 were supplied by the Texas Parks and Wildlife Department and the Louisiana Department of Wildlife and Fisheries. From these lists, captains were selected using a Fortran¹ pseudo-random numbers program so that all licenses had an equal probability of being selected. Three samples, containing 75 names each, were generated for each region to correspond with the three vessel size categories: Boats < 21 feet, boats 21-40 feet long, and boats > 40 feet. These size categories were chosen on the assumption that the entailed fundamental occupational differences with respect to the kinds of fishing activities functionally related to differences in vessel size. It was believed, for example, that as vessel size increases, there would be a corresponding increase in the number of shrimpers who harvest both offshore and inshore and who were economically dependent on shrimping. Results from the survey validate this assumption. By grouping shrimpers in this way it was possible to examine the differential impacts of the Texas closure on shrimpers with varying geographic, occupational, and social characteristics.

When phone numbers could be obtained, interviews were conducted with captains by telephone. A questionnaire was mailed to those names with unlisted phone numbers or without telephones. To supplement this randomized survey effort, interviews were conducted at docks around the perimeter of each bay. This additional effort ensured that 1) enough interviews for analysis were completed, in the limited available time (3 months),

¹Mention of trade names or commercial firms does not imply endorsement by the National Marine Fisheries Service, NOAA.

Table 1.—Interview results from captains randomly selected to participate in the study.

Method	Galveston Bay	Calcasieu Lake
Phone interview		
Interviewed	37	11
Refused	(14)	(4)
No longer shrimping	(37)	(14)
Total	88	29
Mailed interview		
Wrong address	(17)	(85)
Received back	8	7
Total	94	196
Other problems		
Non-English speaking Vietnamese	(43)	(0)
Total interviewed	45	18

2) that all regions in each bay were represented in the survey, and 3) that individuals with little or no knowledge of the English language, i.e., Vietnamese, Italians, and Hispanics were represented. Interpreters were used to interview such members of these ethnic populations. Dockside interviews also were beneficial in that they allowed the researchers to probe and clarify responses.

The survey was supplemented with participant observation and in-depth interviewing. A mixed sample of individuals were selected for in-depth interviews including older and younger shrimpers, fish-house owners, newcomers and long-time participants in the industry, owners of fishing supply and net shops, and bank loan officers.

Collected data were entered into a database management program on the computer. Data were summarized into various groups as needed for analysis. Group comparisons and percentages of various group components were the usual extent of the analysis. Statistical differences between entities were determined with Chi-square procedures (Sokal and Rohlf, 1981).

Results

A total of 159 interviews were completed during the study period, with 89 from the Galveston Bay area and 70 from the Calcasieu Lake site. Table 1 lists the results from the random interview portion of the survey. Supplemental dockside interviews accounted for 50-75 percent of the total interviews at each site,

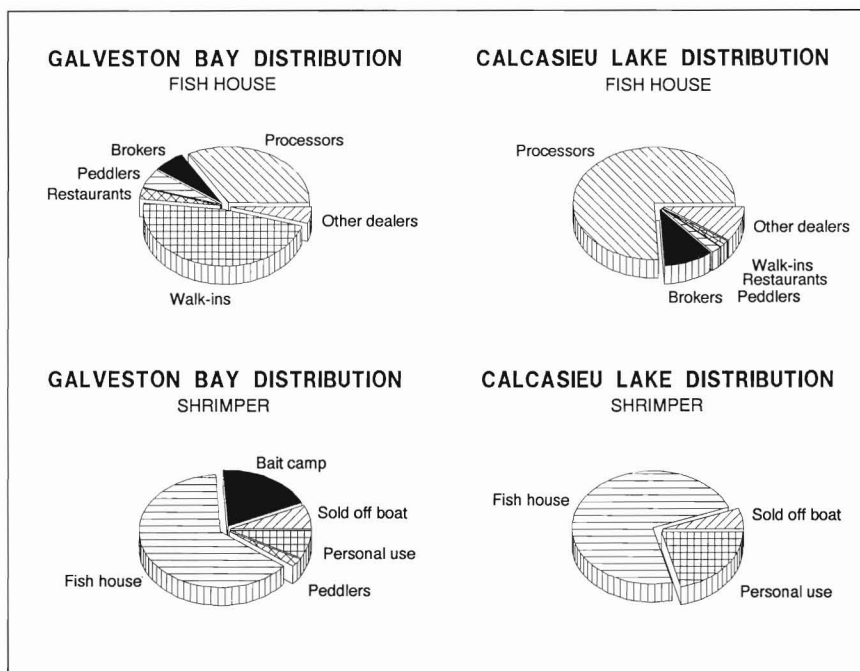


Figure 3.—Market distribution of shrimp catch by shrimpers and local processors at each site.

with 44 conducted around Galveston Bay and 52 from Calcasieu Lake.

Market Distribution Patterns of Shrimp

The market distribution channels of shrimp from the inshore fisheries of Galveston Bay and Calcasieu Lake are illustrated in Figure 3. Examination of the results indicate that while most of the shrimp were destined for shrimp houses, a greater proportion of shrimp from Calcasieu Lake (73 percent) were sold to shrimp houses than from Galveston Bay (63 percent). In Calcasieu Lake, most of the shrimp not destined for shrimp houses were used for personal consumption (21 percent), with the rest sold directly off the boat (6 percent). In Galveston Bay, the remaining shrimp not sold to shrimp houses (37 percent) were distributed either directly from boats to tourists (7 percent) or peddlers (3 percent), used for personal consumption (8 percent), or sold to bait camps (19 percent).

The Calcasieu Lake shrimp houses relied heavily on processors as markets for their shrimp. About 76 percent of the shrimp distributed by Calcasieu Lake's

inshore shrimp houses were destined for processors. Brokers and other dealers were the recipients of the remaining 24 percent of the shrimp distributed by Calcasieu Lake inshore shrimp houses. Galveston Bay's inshore shrimp houses, however, relied more heavily on local markets for shrimp distribution with only 33 percent of the shrimp distributed to processors. Of the remaining 67 percent, about 47 percent was sold to individual customers, 7 percent to brokers, 5 percent to peddlers, 5 percent to other dealers, and 3 percent directly to stores and restaurants.

The role of shrimp houses in the inshore fisheries was examined by assessing 1) the extent of integration of shrimp houses with other sectors of the local industry (i.e., retail and harvesting sectors), 2) the degree of centralization among shrimp houses, and 3) the dependency of shrimp houses servicing inshore boats on shrimp harvested by this fishery. Due to the relatively small size of the inshore fishery in Calcasieu Lake compared with Galveston Bay, owners of all five of the shrimp houses that service the inshore fishery were able to be inter-

viewed. Each shrimp house was heavily integrated with other local sectors of the industry, including harvesting (owning boats) and retail (owning seafood markets). Calcasieu Lake shrimp houses depended largely (89 percent) upon shrimp harvested from local inshore waters.

Of the 21 shrimp house owners interviewed around Galveston Bay, 17 (81 percent) were integrated with another aspect of the local fishery by owning commercial shrimp boats and/or retail seafood markets; 13 (77 percent) owned boats, 12 (71 percent) owned markets, and 8 (47 percent) owned both boats and markets. Four (19 percent) of the shrimp-house owners interviewed reported owning more than one shrimp house. As in Calcasieu Lake, shrimp houses in Galveston Bay that serviced inshore boats seemed highly dependent for their product from local shrimp harvest. During the spring season 83 percent of shrimp passing through these shrimp houses were reported to have come from Galveston Bay, compared with 97 percent during the fall season.

Demographic Profile

The demographic profiles of the inshore fisheries to be presented include certain occupational and personal characteristics of the surveyed populations. The occupational characteristics examined included areas fished and economic dependency on shrimping. Personal information describing the shrimpers included age, years as commercial fishermen, family history in the fishing industry, and employment histories.

Occupational Characteristics

Harvesting areas of inshore shrimpers were examined in both the inshore and offshore locations (Fig. 4). The data indicate that as vessel size increased, there was greater participation of inshore shrimpers in the offshore fishery. This participation was greater in Calcasieu Lake region than in Galveston Bay among small (<21 feet) and large boats (>40 feet), and was approximately equal among medium sized boats (21-40 feet). The most notable difference between the two fisheries in these respects was that 80 percent of the larger boats from Calcasieu

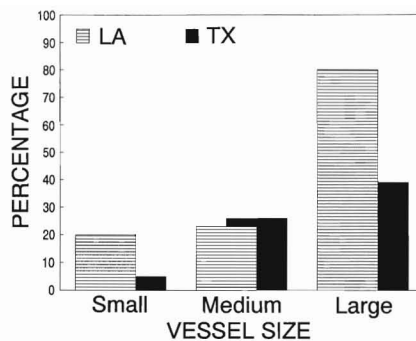


Figure 4.—Percentage of sampled vessels participating in both the inshore and offshore fisheries grouped by vessel size.

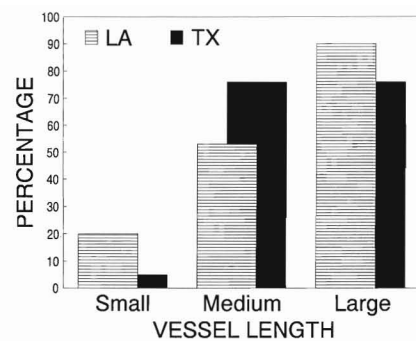


Figure 5.—Percentage of captains, grouped by vessel size, that rely on shrimping for total income.

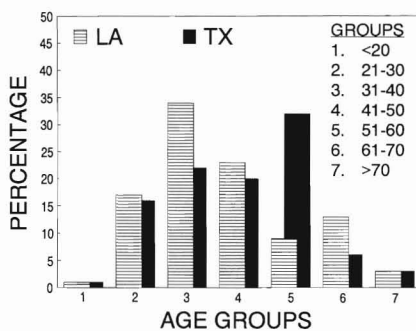


Figure 6.—Age distribution of captains from the two inshore sites.

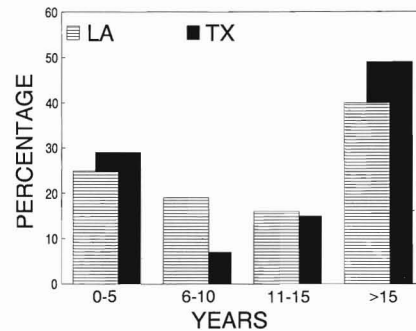


Figure 7.—Distribution of captains, categorized by length of time of their involvement as commercial shrimpers.

Lake fished both inshore and offshore while only 39 percent of Galveston Bay large vessels worked both inshore and offshore.

Trends by vessel size among inshore shrimpers regarding economic dependence on shrimping was next examined (Fig. 5). Overall, 54 percent of the Calcasieu Lake shrimpers and 62 percent of the Galveston Bay shrimpers reported to be fully dependent on these occupations for monetary support. In both populations there was an increased number of shrimpers fully dependent upon their occupation for income as vessel size increased. Among the small and large vessels, there were proportionally more Calcasieu Lake shrimpers fully dependent on shrimping than Galveston Bay shrimpers. However, few small boats in either population relied totally on shrimping for their income. The opposite

was true for medium sized boats, in which proportionally more Galveston Bay shrimpers were economically dependent on shrimping than among Calcasieu Lake's medium sized boat operators.

Personal Characteristics

The age distribution of inshore shrimpers in both regions was examined (Fig. 6). Within 10-year cohorts, the highest proportion of shrimpers was 31-40 years of age in Calcasieu Lake, whereas the greatest number of Galveston shrimpers was 51-60 years of age. The median ages of the Calcasieu Lake and Galveston Bay shrimpers were 39.4 and 47, respectively.

The number of years that shrimpers in each population had been commercial shrimpers was next investigated (Fig. 7). These data allowed estimation of when periods of growth (people entering into

the shrimping profession) took place. While the greatest period of growth in each fishery seemed to have occurred more than 15 years ago, there was some indication that a minor growth period had occurred within the last 5 years in Galveston Bay's fishery, and within the last 10 years in the inshore fishery of Calcasieu Lake.

There was some indication that the captains who had been in the fishery the longest time operated the larger boats (Fig. 8). The means, however, were not significantly different. No information was available from the captains of small boats in Galveston Bay because questions related to this aspect were added to the survey after most of this population had already been interviewed.

If captains reported having a parent or grandparent who were commercial fishermen, they were coded as coming from a family involved in fishing. The results indicate that 62 (70 percent) of the shrimpers in Galveston Bay came from fishing families compared to 29 (41 percent) of the Calcasieu Lake shrimpers (Fig. 9). The differences in frequencies between these two populations were statistically significant ($P = 0.01$). Of those shrimpers who came from fishing families, most had been in the fishery >10 years. Among the Galveston Bay sample, 80 percent of shrimpers with a history of family involvement in shrimping entered the fishery >10 years ago. Among the Calcasieu Lake sample, 67 percent with a family history in shrimping had entered the fishery >10 years ago.

Employment histories from both were grouped by job skills (Table 2). The Calcasieu Lake shrimpers were characterized by less diversity in their occupational histories (fewer job types) than Galveston Bay shrimpers. Results indicate that among Calcasieu Lake shrimpers, 70 percent had histories dominated by manual labor (construction worker, welder, carpenter, mechanic, oil field worker, pipefitter, cementer, tool picker, net maker, repairman, etc.). Of the remaining individuals, 7 percent were previously employed in service oriented occupations (truck driver, security guard, police officer, armed forces,

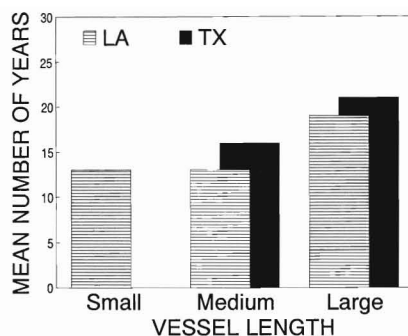


Figure 8.—Distribution of captains, categorized by both mean length of time of their involvement as commercial shrimpers and size of vessel they operate.

preacher, salesman, etc.), 9 percent were small business owners or managers (grocery store, boat retail, fish house, etc.), 2 percent were in technical fields (laboratory technician), and 9 percent claimed they had no other skills. No response to this part of the questionnaire was received from 3 percent of the interviewed population.

The Galveston Bay shrimpers had a more diverse range of occupational histories compared to Calcasieu Lake shrimpers (Table 2). Like the Calcasieu Lake population, most Galveston Bay shrimpers (48 percent), were previously employed in skilled manual labor jobs. Of the remaining, 9 percent were employed in service occupations, 9 percent were owners or managers of small businesses, 8 percent were in technical fields, 4 percent were professional (research engineer and school administrator), 9 percent were in unskilled labor (mushroom picker, dish washer, etc.), 10 percent had no other skills, and 3 percent gave no response.

Texas Closure

An effort was made to solicit opinions and perceived impacts of the Texas closure from inshore shrimpers. Among the Calcasieu Lake shrimpers, 75 percent expressed no opinion regarding the Texas closure, and most of the remaining shrimpers (20 percent) disapproved of the closure (Fig. 10). The Galveston Bay

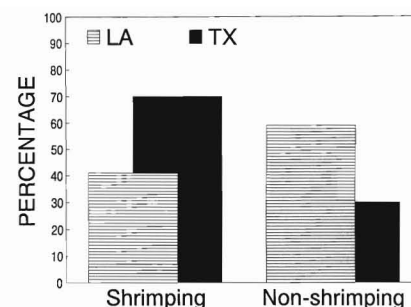


Figure 9.—Percentage of interviewed captains categorized by having either shrimping or nonshrimping family background.

Table 2.—Distribution of job skills by region.

Skills	Galveston Bay	Calcasieu Lake
No other skills	9 (10%)	6 (9%)
Unskilled labor	8 (9%)	0 (0%)
Skilled manual labor	43 (48%)	49 (70%)
Service occupation	8 (9%)	5 (7%)
Small bus. owner/mgr.	8 (9%)	6 (9%)
Technician	7 (8%)	2 (2%)
Professional	4 (4%)	0 (0%)
No response	2 (2%)	2 (3%)

shrimpers were more opinionated, but even so only 45 percent expressed an opinion regarding the Texas closure. The opinions were almost equally divided between favoring (24 percent) and disapproving (20 percent) of the closure. The comments from shrimpers revealed that the impact of the Texas closure on inshore shrimpers increased with vessel size (Fig. 11). Proportionally more captains of the medium sized boats in Galveston Bay (20 percent) were personally affected by the closure than in Calcasieu Lake (10 percent). Conversely, proportionally more captains of the large Calcasieu Lake boats (32 percent) were impacted by the closure than captains of the corresponding size category of Galveston Bay boats (28 percent).

Comments from most of the Calcasieu Lake shrimpers with an expressed opinion indicated that their work activities were affected by the displacement of Texas boats into Louisiana as a result of

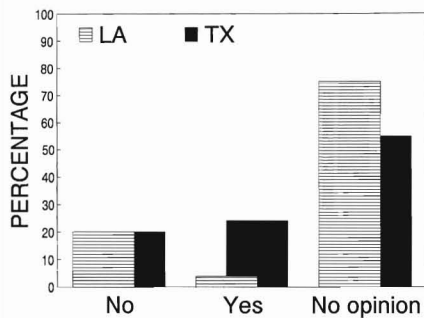


Figure 10.—Percentage of captains against (NO), in favor of (YES), or with no opinion about the closure of Federal waters off Texas.

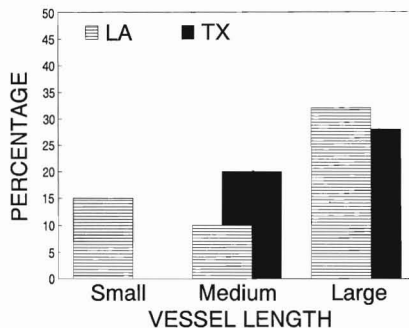


Figure 11.—Percentage of captains, categorized by vessel size, who felt the Texas closure regulations impacted their lives.

the closure. Crowded fishing grounds, reduced catches, and reduction in both supplies and dock space available to local shrimpers were cited by Louisiana shrimpers as consequences of the closure-induced displacement of Texas vessels. Some of the captains of large boats remarked that reduction in catch negatively impacted their incomes. However, one captain of a large boat commented that during the Texas closure there was a resultant increase in the price of shrimp offered in Louisiana, thus having a positive impact on his income.

The captains of large Texas boats reported to have experienced personal impacts of the Texas closure of three types: 1) Traveling to Louisiana to shrimp because it was too dangerous and uneconomical to travel farther out than 15 miles (the extent of the Texas closure during the 1986-88 seasons), 2) shrimping only in Galveston Bay which was already overcrowded and, consequently, they experienced a reduction in income, and 3) the drop in the price of shrimp following the opening of the closure. Similarly, the captains of medium sized Galveston boats complained of overcrowding in the bay during the closure, and of a decrease in the price of shrimp following the closure.

Discussion and Conclusions

This study has attempted to highlight some similarities and differences be-

tween participants in the inshore shrimp fisheries from the Texas-Louisiana boundary area along the Gulf Coast. Comparisons were made in such areas as marketing infrastructure, demographic profiles, and impacts of the Texas closure.

The results of the survey suggest that the inshore fisheries in each region were distinct from the offshore fisheries. This was evidenced by 1) the small degree of territorial overlap of offshore and inshore fisheries among small and medium sized boats, the two size categories comprising the majority of the inshore fisheries, 2) the dependence of shrimp houses serving inshore boats on the shrimp harvested from inside waters, and 3) the high degree of local shrimp house integration within each of the inshore fisheries examined.

Regional differences existed with respect to how shrimp was marketed. Most of the shrimp from the Calcasieu Lake fishery was sold to shrimp houses, which in turn sold them to both local and non-local processors. Thus, the vertical marketing integration within this fishery existed largely between the shrimp houses and processing plants. This marketing practice not only channels shrimp profits out of this rural community, but also makes the inshore fishery economically tied to the infrastructure of the offshore fishery since shrimp from the offshore fishery are going to these same processing plants. The shrimp that bypassed the

shrimp house were primarily used for personal consumption.

In contrast, much of the shrimp profits in the Galveston Bay fishery remained within this greatly urbanized community since most shrimp were distributed to customers by local shrimp houses and were not sold to processors. Thus, the inshore and offshore fisheries in the area are more loosely connected at the processor level and their infrastructures not as intertwined as in Calcasieu Lake. The majority of the shrimp bypassing the shrimp houses was distributed to recreational fishermen through bait camps.

An understanding of distribution and marketing channels is important in determining the overall value of the shrimp fishery to local economies. To date, when economists determine the value of the shrimp fishery to the economy in general, they do not distinguish between the differences that exist between each fishery. Consequently, it is assumed that shrimp is exchanged only once within the community and a value to the fishery is accordingly estimated². Thus, in situations where shrimp is exchanged more often within a community, the value of the fishery is likely to be underestimated. The results of this study suggest that shrimp is exchanged more often within the communities surrounding Galveston Bay than Calcasieu Lake.

This difference between Calcasieu Lake and Galveston Bay, with regard to marketing channels, or the number of times a particular shrimp "changes hands" within a single localized area while on its way from shrimper to consumer, is a function of the size of the population base and industrial complexes surrounding the area. In the Calcasieu Lake situation, like most rural coastal areas, each shrimper is extremely dependent on the income received from selling shrimp to the shrimp house, since few other jobs are available in the surrounding community. Yet, because of the weak industrial complex and small population base in the area (< 1 percent of the population found around Galveston Bay), the

²M. Wilson, Research Assistant, Tex. A&M Univ., Dep. Wildl. Fish., Coll. Sta., Tex. Personal commun., 1988.

shrimp house sells the shrimp to nonlocal buyers and processors and the profits after that point are distributed outside of the local economy. In the Galveston Bay situation, like most urbanized coastal areas, each shrimper feels dependent on shrimping for his income, but since other jobs are available in the community, he could still remain employed in the area even if he decided to quit his shrimp harvesting profession. With the large population base and industrial complexity of the area, the shrimp house is able to sell to many local markets, which tends to multiply the initial profits and keep them within the local economy.

The demographic profiles of the populations indicate that different social processes are occurring within the two fisheries. First, data on number of years each captain has been active in the fishery suggest a gradual increase in Calcasieu Lake's fishery within the last 10 years, while much of the recent growth in Galveston Bay's fishery has occurred only within the last 5 years. Expansion in Galveston Bay's fishery can largely be attributed to influx from the growing Asian immigrant populations in the area, while the increase in the Calcasieu Lake fishery coincides with local economic declines from oil production (Petty, 1986). Second, more of the Galveston Bay shrimpers came from fishing families than Calcasieu Lake shrimpers. In both populations, family involvement in fishing was less evident among the newer participants than among the shrimpers with more experience. This, coupled with the fact that Calcasieu Lake shrimpers were generally younger than Galveston Bay shrimpers, suggests that the Calcasieu Lake fishery is a newer fishery than Galveston Bay's fishery. It also reflects the importance of the inshore fishery in rural areas as an employment safety net during times of economic hardship.

More of the Galveston Bay inshore fishermen reported impacts from the Texas closure than did shrimpers from the fishery in Calcasieu Lake. The size of Galveston Bay can support many of the

larger offshore boats displaced by the closure. Consequently, the areas in which the inshore shrimpers harvest became increasingly crowded during the closure, resulting in a reduction of income. This impact of the closure was reported by about 30 percent of the Galveston shrimpers interviewed. Only 20 percent of the Calcasieu Lake interviewees reported direct personal impacts of the Texas closure. Operators of large boats most frequently reported impacts among the Calcasieu Lake sample. Crowded fishing grounds and limited dock space and supplies were cited as the major impacts. The depth and size of Calcasieu Lake, coupled with prohibition of Texas boats from using butterfly nets limits the opportunities of larger Texas boats from harvesting in this body of water. Therefore, it is not surprising that it was the larger Calcasieu boats, that harvest both offshore and inshore, which reported the greatest impact. It seems likely that what was described by Calcasieu Lake shrimpers was, in fact, the offshore impacts of the Texas closure rather than on the inshore fishery. Thus, only vessels fishing in offshore waters would feel the impact and report it. Comments from captains of large inshore vessels about the impacts of the closure are similar to those given by offshore shrimp vessel captains from the same area (Klima et al., 1987; Nance et al., 1988).

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